

CLAIMS

1. An electronic emission device (50) with several electron beams (59) comprising a first structure (6) comprising a plurality of emitting sources (61) of electron beam (69) hybridised (9) with a second structure (7) comprising a plurality of diaphragm openings (8).

2. The device as claimed in the preceding claim, in which the second structure (7) is formed by an electrode or a metallic or conductive or semiconductive membrane (70).

3. The device as claimed in Claim 1 or 2, in which hybridisation (9-9') between the first and the second structure (6-7) is carried out by the interposition of metallic balls (90), especially balls made from fusible metal alloys and/or balls made from gold.

4. The device as claimed in Claim 1 or 2, in which hybridisation (9-9') between the first and the second structure (6-7) is carried out by interposition of one or more films with anisotropic conduction.

5. The device as claimed in any one of Claims 1 to 4, in which at least one diaphragm opening (80) has two different opposite opening surfaces (81/82), the opening surface (81) of one side of the diaphragm (70) having a area greater than the area of

the other opening surface (82) of the other side of the diaphragm (70).

5        6. The device as claimed in any one of Claims 1 to 5, in which each diaphragm (70) opening (80) comprises a bevelled, flat, concave or convex opening edge profile (83).

10       7. The device as claimed in any one of Claims 1 to 6, in which each structure (6, 7) comprises a periodic arrangement of the sources (61, 62) of emission of electrons or diaphragm openings (8, 80), the structures (6, 7) especially having a matricial arrangement or a multilinear arrangement or a linear  
15       arrangement, regular or irregular.

20       8. The device as claimed in any one of Claims 1 to 7, in which the sources (61, 62) of electron beam emission (69) and the diaphragm (70) openings (8, 80) are arranged with spacing of about a few microns to one millimetre.

25       9. The device as claimed in any one of Claims 1 to 8, further comprising electrostatic or magnetic or electromagnetic means or system (4) for focussing electron beams.

30       10. The device as claimed in any one of Claims 1 to 9, further comprising means or a focussing system (40) by magnetic projection.

11. The device as claimed in any one of Claims 1 to 10, further comprising third means, or a third polarised anode or electrode structure (40) arranged outside the second structure (7) of diaphragm openings (70).

12. The device as claimed in any one of Claims 1 to 11, in which the second structure (7) comprises at least one conductive part (70, 75) and at least one dielectric part (71, 72, 76, 77).

13. The device as claimed in any one of Claims 1 to 12, in which the second structure (7) comprises two levels (70, 75) of electrodes or membranes, metallic, conductive, attached to at least one dielectric layer (71, 72).

14. The device as claimed in any one of Claims 1 to 13, in which the second structure (7) has, around the zones (73, 78) of diaphragm (70) openings (8), a thickness of about a fraction of a micrometer to a few hundred micrometers.

15. The device as claimed in any one of Claims 1 to 14, in which the second structure (7) has, outside the zones (73, 78) of diaphragm openings (8), a thickness (71, 72, 76, 77) of about one micrometer to around one millimetre.

16. The device as claimed in any one of Claims 1 to 15, in which the second structure (7) has

an alveolar structure insulating each opening (8) or several groups of openings from one another, such that each opening or each group of openings is subjected to a respective polarisation potential.

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17. The device as claimed in any one of Claims 1 to 16, in which at least one side (82,82',83) of the diaphragm (70) of the second structure is dipped into an electric field (E2) for acceleration or focussing of electrons.

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18. The device as claimed in any one of Claims 1 to 17, in which the second structure (7) of diaphragm opening (70) comprises two opposite sides (81/82), a side (81) facing an electric field (E1), the other side (82) facing another electric field (E2).

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19. The device as claimed in Claim 5 or 6 taken in combination with Claim 17 or 18, in which the diaphragm (70) openings (80, 80') are oriented such that the opening surface of greater area (82,81') faces the electric field of greater value (E2,E1'), the opening surface of lesser area (81,82') facing the electric field of less value (E1,E2') or in the absence of an electric field.

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20. The device as claimed in any one of Claims 1 to 19, in which the second structure (70) is subjected to at least one polarisation potential (Vd, Vd1, VD2).

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21. The device as claimed in any one of the preceding claims, in which the first structure comprises a substrate (160), a cathode (120), electron emitter means (124), an extraction grid (126), and in which the second structure forms current collection means (140), insulated from the extraction grid and arranged so as to collect part of the current emitted by the emitter means, measuring means (142) of the current collected, and means for control, as a function measuring the collected current, of the current emitted by the electron emitter means.

22. The device as claimed in Claim 21, the electron emitter means (124) comprising at least one micro-point or one nanotube.

23. The device as claimed in Claim 21 or 22, in which the current control means emitted by the electron emitter means comprise pulsed polarisation means (134) of the extraction grid (126).

24. The device as claimed in Claim 21 or 22, in which the current control means emitted by the electron emitter means comprise pulsed polarisation means (134) of the cathode.

25. The device as claimed in any one of Claims 21 to 24, in which the substrate is a CMOS substrate (160).

26. The device as claimed in Claim 25, comprising electrical crossing enabling to connect the collection means (146) and the extraction grid to the CMOS substrate (160).

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27. The device as claimed in any one of Claims 21 to 25 in combination with Claim 3, in which the collection means (140) are connected by electrical and mechanical interconnection means formed by the balls or a pillar to a conductive zone (171).

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28. The device as claimed in Claim 27, the current-measuring means (142) being located in the substrate.

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29. The device as claimed in any one of Claims 21 to 27, the current-measuring means (142) being made on a substrate on which the collection means are located.

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30. The device as claimed in any one of Claims 21 to 29, the current-measuring means (142) comprising an amplifier (180) on which a condenser (182) or a resistor (184) is mounted in counter-reaction.

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31. The device as claimed in the preceding Claim, the current-measuring means (142) comprising a measuring setup by current mirror.

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32. The device as claimed in Claim 31, the openings being circular or comprising circular sectors (100, 102, 104).